

A.D. 1866, 8th MAY. N° 1320.

Evaporating Volatile Liquids to Obtain Light or Heat.

LETTERS PATENT to James Lee Norton, of Belle Sauvage Yard, Ludgate Hill, in the City of London, and Alfred Giles, of Manchester, in the County of Lancaster, for the Invention of "IMPROVEMENTS IN APPARATUS TO BE EMPLOYED IN EVAPORATING VOLATILE AND COMBUSTIBLE LIQUIDS TO OBTAIN LIGHT OR HEAT THEREFROM."

Sealed the 3rd November 1866, and dated the 8th May 1866.

PROVISIONAL SPECIFICATION left by the said James Lee Norton and Alfred Giles at the Office of the Commissioners of Patents, with their Petition, on the 8th May 1866.

We, JAMES LEE NORTON, of Belle Sauvage Yard, Ludgate Hill, in the
5 City of London, and ALFRED GILES, of Manchester, in the County of Lancaster, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN APPARATUS TO BE EMPLOYED IN EVAPORATING VOLATILE AND COMBUSTIBLE LIQUIDS TO OBTAIN LIGHT OR HEAT THEREFROM," to be as follows:—

This Invention has for its object improvements in apparatus to be employed
10 in evaporating volatile and combustible liquids to obtain light or heat therefrom. For this purpose we employ a close vessel, to the lower part of which the combustible liquid is supplied, either by a bird fountain arrangement or

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other means. The liquid we prefer to employ is the more volatile portions of the earth oil of the United States and other places. In the close vessel above mentioned is a moving surface which is kept moistened by the liquid. We prefer that this surface should be in the form of a drum covered with wire gauze in one or more layers; the drum dips into the liquid at the bottom of 5 the containing vessel, and is caused to revolve; it thus takes up the liquid, so that its surface is constantly kept moist. Air under pressure is led into the close vessel in which is the evaporating drum or surface. We prefer to lead it into the interior of the drum, which can conveniently be done by making the axis hollow; the air then passes through the wire gauze, and so becomes 10 charged with vapour, and it is then by a suitable passage led away from the close vessel to the burner where it is to be burnt to obtain light or heat.

In connection with this apparatus we employ an arrangement for supplying atmospheric air at a small pressure; this may be a weighted bag or gasholder, or mechanism like a gas meter may be kept in motion by a weight or spring 15 and a train of wheels or gearing; and in this latter case the same maintaining power may advantageously be employed for giving motion to the evaporating drum or surface. Or a convenient arrangement is to employ bellows, like organ bellows, driven by a spring or weight or other maintaining power, and forcing air, as in an organ, into a collapsible air reservoir; a spring or similar 20 instrument tends constantly to compress this reservoir, and it acts the more forcibly as the reservoir gets fuller; thus the apparatus may be made self-regulating, as when the resistance to the entry of air into the reservoir reaches a certain point the maintaining or driving power is unable to overcome it, or overcomes it but slowly, and then the reservoir empties until an equilibrium 25 is established. In order that the air may pass to the burners from the reservoir at a constant pressure the air is caused to pass through a regulator after it leaves the reservoir.

In place of charging atmospheric air with combustible vapour in this manner ordinary illuminating gas may very advantageously be enriched in a 30 similar manner, and in this case no compressing apparatus is necessary. If a gas meter is employed the drum of the meter may conveniently be employed to give motion to the evaporating drum or surface, and when the measuring of the gas is not required mechanism in the nature of a gas meter or other means may be employed for the purpose of driving the evaporating drum or 35 surface.

When using combustible liquids which do not volatilize very readily the air or gas passing into the evaporating vessel may be warmed by means of a small gas burner under the pipe through which it passes. Or the evaporating

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vessel may be surrounded with a water or air casing kept warm by a small gas burner. In each case the temperature should be regulated and kept uniform by self-acting apparatus.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed
5 by the said James Lee Norton and Alfred Giles in the Great Seal Patent Office on the 8th November 1866.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, JAMES LEE NORTON, of Belle Sauvage Yard, Ludgate Hill, in the City of London, and ALFRED GILES, of Manchester, in the County of Lancaster, send greeting.

10 **WHEREAS** Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Eighth day of May, in the year of our Lord One thousand eight hundred and sixty-six, in the twenty-ninth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said James Lee Norton and Alfred Giles, Her special licence that we, the
15 said James Lee Norton and Alfred Giles, our executors, administrators, and assigns, or such others as we, the said James Lee Norton and Alfred Giles, our executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise,
20 and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVEMENTS IN APPARATUS TO BE EMPLOYED IN EVAPORATING VOLATILE AND COMBUSTIBLE LIQUIDS TO OBTAIN LIGHT OR HEAT THEREFROM**," upon the condition (amongst others) that we, the said James Lee Norton and Alfred Giles, our executors or
25 administrators, by an instrument in writing under our or their hands and seals, or under the hand and seal of one of us or them, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the
30 date of the said Letters Patent.

NOW KNOW YE, that we, the said James Lee Norton, on behalf of myself and the said Alfred Giles, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say:—

35 This Invention has for its object improvements in apparatus to be employed in evaporating volatile and combustible liquids to obtain light or heat there-

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from. For this purpose we employ a close vessel, to the lower part of which the combustible liquid is supplied, either by a bird fountain arrangement or other means. The liquid we prefer to employ is the more volatile portions of the earth oil of the United States and other places. In the close vessel above mentioned is a moving surface, which is kept moistened by the liquid. 5 We prefer that this surface should be in the form of a drum covered with wire gauze in one or more layers; the drum dips into the liquid at the bottom of the containing vessel, and is caused to revolve; it thus takes up the liquid, so that its surface is constantly kept moist. Air under pressure is led into the close vessel in which is the evaporating drum or surface. We prefer to 10 lead it into the interior of the drum, which can conveniently be done by making the axis hollow, the air then passes through the wire gauze and so becomes charged with vapour, and it is then by a suitable passage led away from the close vessel to the burner where it is to be burnt to obtain light or heat. 15

In connection with this apparatus we employ an arrangement for supplying atmospheric air at a small pressure; this may be a weighted bag or gasholder, and this is what we prefer; or mechanism like a gas meter may be kept in motion by a weight or spring and a train of wheels or gearing, and in this latter case the same maintaining power may be employed for giving motion to 20 the evaporating drum or surface. Or a convenient arrangement is to employ bellows, like organ bellows, driven by a spring or weight or other maintaining power, and forcing air, as in an organ, into a collapsible air reservoir. A spring or similar instrument tends constantly to compress this reservoir, and it acts the more forcibly as the reservoir gets fuller; thus the apparatus may 25 be made self-regulating, as when the resistance to the entry of air into the reservoir reaches a certain point the maintaining or driving power is unable to overcome it, or overcomes it but slowly, and then the reservoir empties until an equilibrium is established. In order that the air may pass to the burners from the reservoir at a constant pressure the air is caused to pass 30 through a regulator after it leaves the reservoir.

In place of charging atmospheric air with combustible vapour in this manner ordinary illuminating gas may very advantageously be enriched in a similar manner, and in this case no compressing apparatus is necessary. If a gas meter is employed the drum of the meter may conveniently be employed 35 to give motion to the evaporating drum or surface, and when the measuring of the gas is not required mechanism in the nature of a gas meter or other means may be employed for the purpose of driving the evaporating drum or surface.

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When using combustible liquids which do not volatilize very readily the air or gas passing into the evaporating vessel may be warmed by means of a small gas burner under the pipe through which it passes. Or the evaporating vessel may be surrounded with a water or air casing kept warm by a small
5 gas burner.

And in order that our said Invention may be most fully understood and readily carried into effect we will proceed to describe the Drawings hereunto annexed.

DESCRIPTION OF THE DRAWINGS.

10 Figure 1 is an end view of a generating vessel made according to our Invention, and it is shewn with the end plate taken away in order to shew the driving pinion and wheel; Figure 2 is a side view, and Figure 3 is a view of the other end of the same; Figure 4 is a cross section of the revolving drum, which, as shewn, consists of three layers of wire gauze, and revolves
15 within the generating vessel.

A is the generating vessel; B, the hollow axis through which the air is admitted; C, the cock which admits the volatile liquid; D is a let-off cock; E is a gauge for the purpose of ascertaining the quantity of liquid in the vessel; F is the gas pipe through which the gas when it is generated passes
20 to the burner; G is a coupling on the axis of the driving pin to which the motive power is applied. The axis of the pinion and the hollow axis of the revolving drum pass through air-tight stuffing boxes.

In Figure 5 is shewn an apparatus known by the name of a bird fountain, and by means of which the liquid is supplied to the generating vessel. A is a
25 closed vessel containing a supply of liquid; B is a pipe leading from this vessel to the generator C; another pipe D enters the generator a little above the pipe B, and passes nearly to the top of the vessel A. Supposing the generating vessel to be empty and the vessel A nearly full, if the cock E is open the liquid will run from the vessel A into the generating vessel C, the
30 air necessary to supply its place passing through the pipe D; but when the liquid in C is sufficiently high to stop up the orifice of the pipe D no more air can get into the vessel A, and consequently the pressure of the air in the vessel C effectually prevents the entrance of any more liquid, and an uniform supply is thus ensured. By means of the funnel and cock F the vessel A
35 may be replenished when empty. G is a cup in which the bottom of the funnel is immersed to prevent the escape of air in this direction when the cock is open.

The spirit which we prefer to employ has a specific gravity of about .670;

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in fact the lighter the better ; and supposing the arrangement to be such as is shewn in the Drawing, the apparatus should be of such a size as to allow about one-third of a square foot of drum periphery or outer surface for each ordinary burner to be supplied, and the drum may revolve about two and a half times per minute. In manufactories and other places the drum may 5 frequently be conveniently driven by a band receiving motion from a shaft which revolves continuously, otherwise a train of wheels and a spring or weight may be employed. The air may conveniently be supplied at a pressure corresponding with, say, five or six inches of water ; in most cases it will be convenient to employ a gasholder of suitable capacity, either flexible or 10 otherwise, and weighted to the degree required, or air forcing apparatus such as herein-before referred to may be employed.

Figure 6 shews a section of a regulating valve through which the compressed air passes before it reaches the generating vessel. A is a double beat valve shutting against the brass seats B, B, and connected to the flexible 15 disc C by the rod D. To the flexible disc is also connected the lever E by means of the rod F. G is the inlet, and H the outlet. By means of the weight I, which can be moved along the lever E, the pressure on the disc C can be regulated at will. The compressed air entering at G presses against the disc C, and as soon as the desired pressure has been attained on the outlet 20 side it raises the disc and closes the valve, thus preventing the entrance of more air until the pressure again falls.

Figure 7 shows a plan for warming the volatile liquid before it enters the generator, that it may there be more readily volatilized. Such an arrangement is useful when a sufficiently light spirit to work without heat is not 25 obtainable. A gas jet A is placed underneath the feed pipe B, C being the generator.

Figure 8 is another plan of effecting the same object. The generating vessel A is surrounded by a jacket B, underneath which is a gas jet C. The jacket B is filled with water or air, and the warmth thus supplied facilitates 30 the evaporation of the liquid. The gas burners shewn in Figures 7 and 8 should be of small size, so that under any circumstances which can occur in working they may not be able to heat the liquid up to its boiling point, indeed the boiling point of the spirit should not be approached.

It is evident from the portable nature of apparatus such as is above 35 described that it can be applied to generate gas not only in all cases where gas is now used, but also in many cases where the use of gas has been prevented owing to the bulky and unportable nature of the apparatus hitherto used for its generation. If desired the form of the moving instrument in the

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generating vessel may be modified, so that it may also maintain a continuous supply of spirit to other stationary surfaces within the generating vessel.

Figure 9 is a horizontal section, and Figure 10 is a cross section of another apparatus for distributing the liquid over the evaporating surface or surfaces. 5 A is a hollow shaft carrying the hollow arms B, B, B, and revolving in the vessel C. The liquid is supplied to the bottom part of the vessel C, and the arms in revolving dip into the liquid and carry it to the hollow shaft through which it flows through the trough or pipe D. The bottom of this trough is perforated with small holes, and underneath this trough are fixed the plates or 10 surfaces E, E, E, which are formed of wire gauze, and may be covered with cotton or other material. The liquid runs through the small holes in the bottom of the trough D, and percolates through the wire gauze plates on the cotton or other material covering the plates. The compressed air is forced in through the pipe F, and is caused to travel in a zig-zag direction between the 15 plates, as shewn by the arrows, until it is finally driven out to the gas outlet G. The surplus liquid which is not evaporated runs through the opening H into the vessel C.

Figure 11 shews another method of raising the liquid, being on the principle of an ordinary chain pump. When the buckets reach the top they are over- 20 turned, and the liquid runs into the vessel A, and thence through the opening B into the trough D (Figure 9); other methods may also be used for raising the liquid.

What we claim is the employment of a moving instrument in the generating vessel arranged in such manner as to maintain and constantly renew 25 an extended surface of the volatile and combustible liquid, as herein described.

In witness whereof, I, the said James Lee Norton, have hereunto set my hand and seal, this Seventh day of November, in the year of our Lord One thousand eight hundred and sixty-six.

J. L. NORTON. (L.S.)

LONDON:

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1866.

FIG. 1.

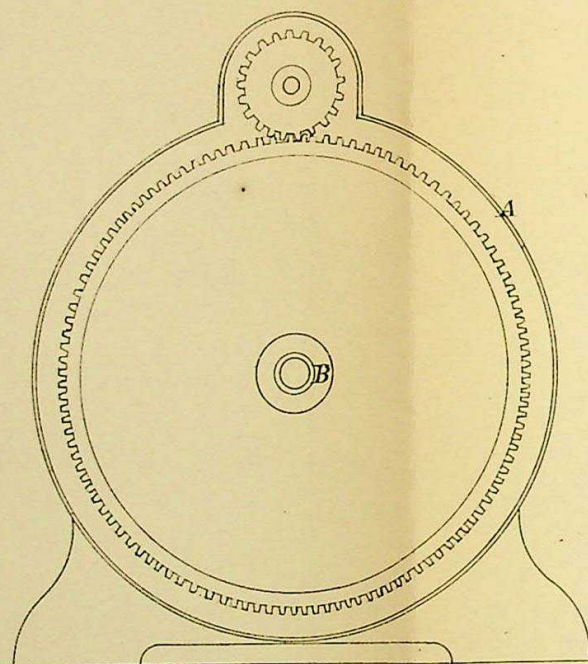


FIG. 2.

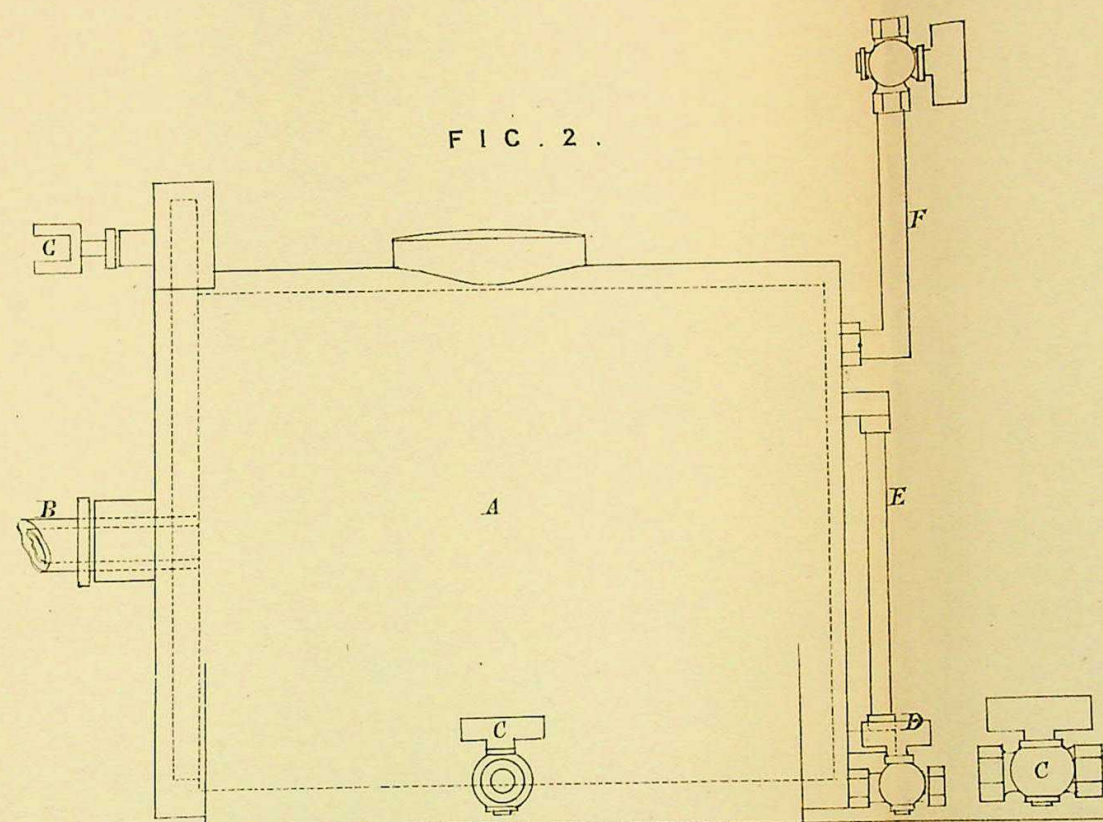


FIG. 3.

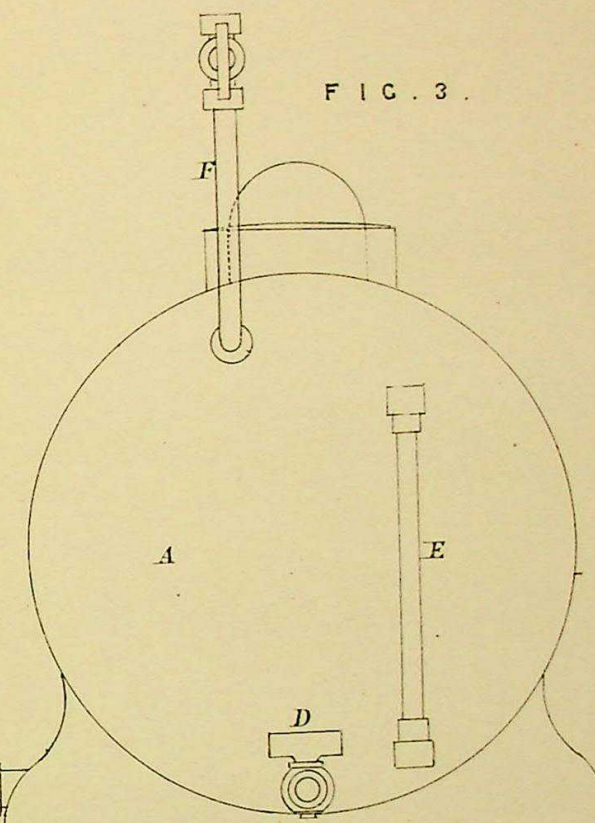


FIG. 7.

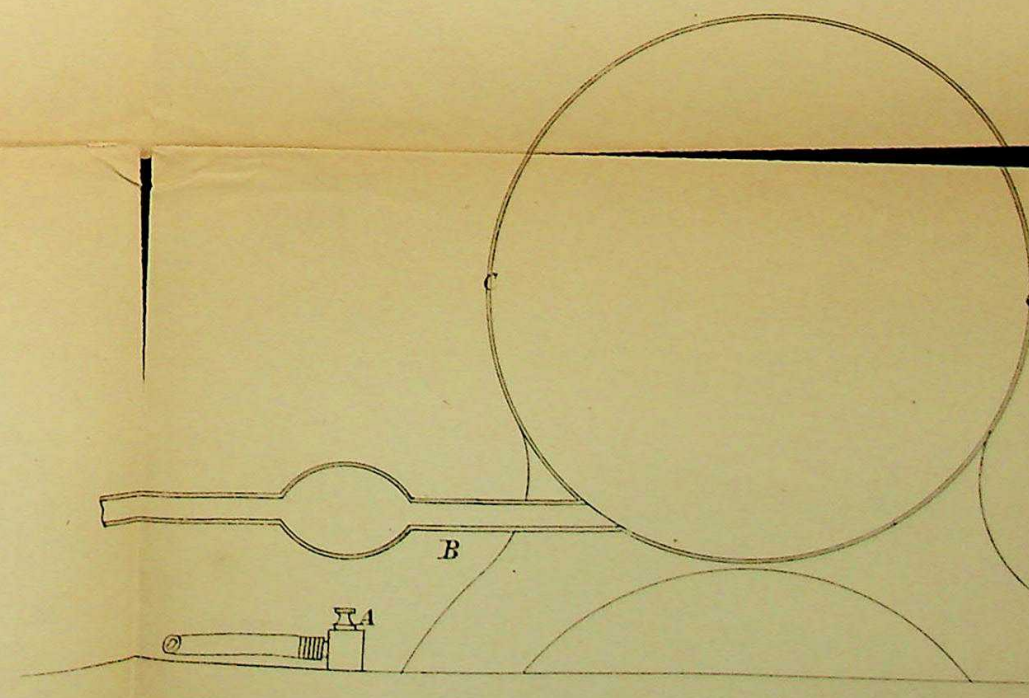
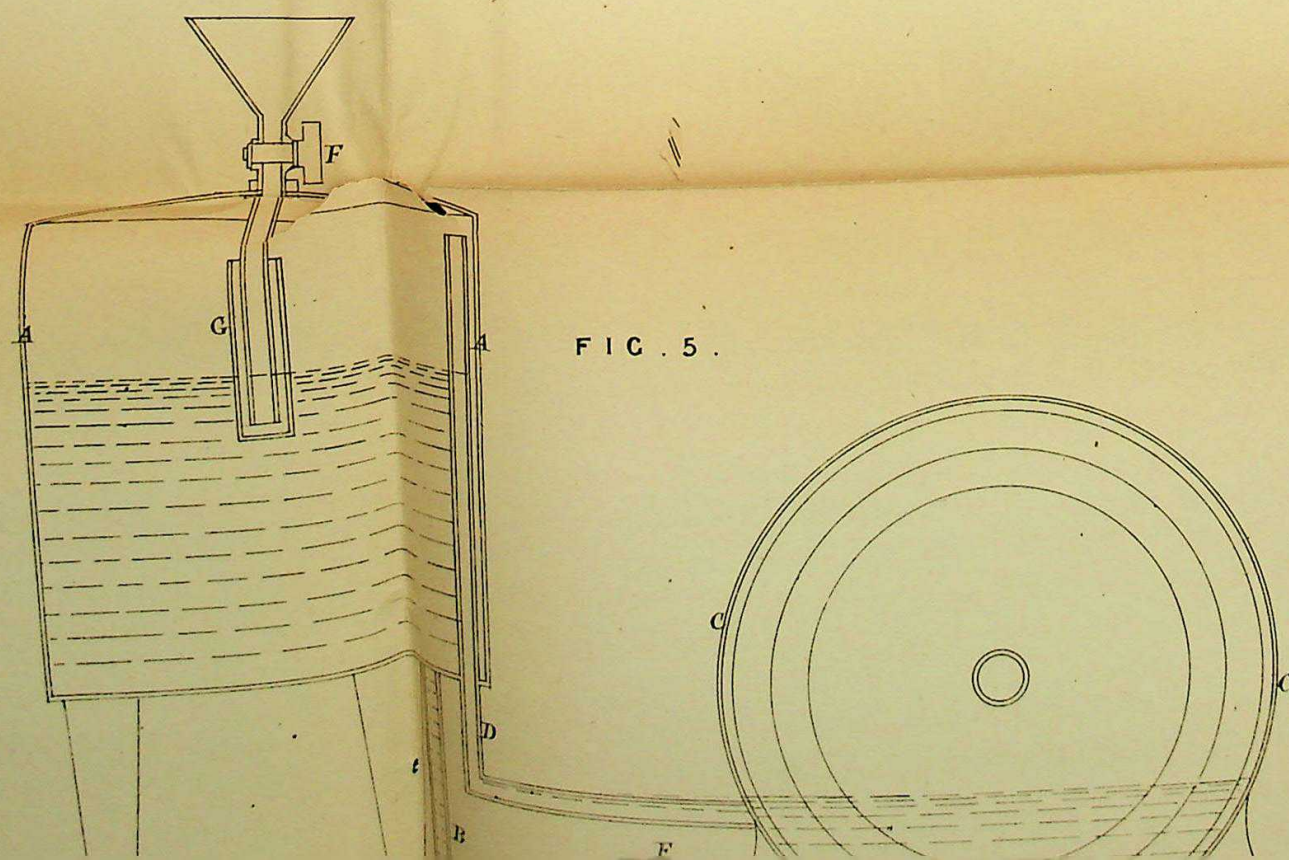


FIG. 5.



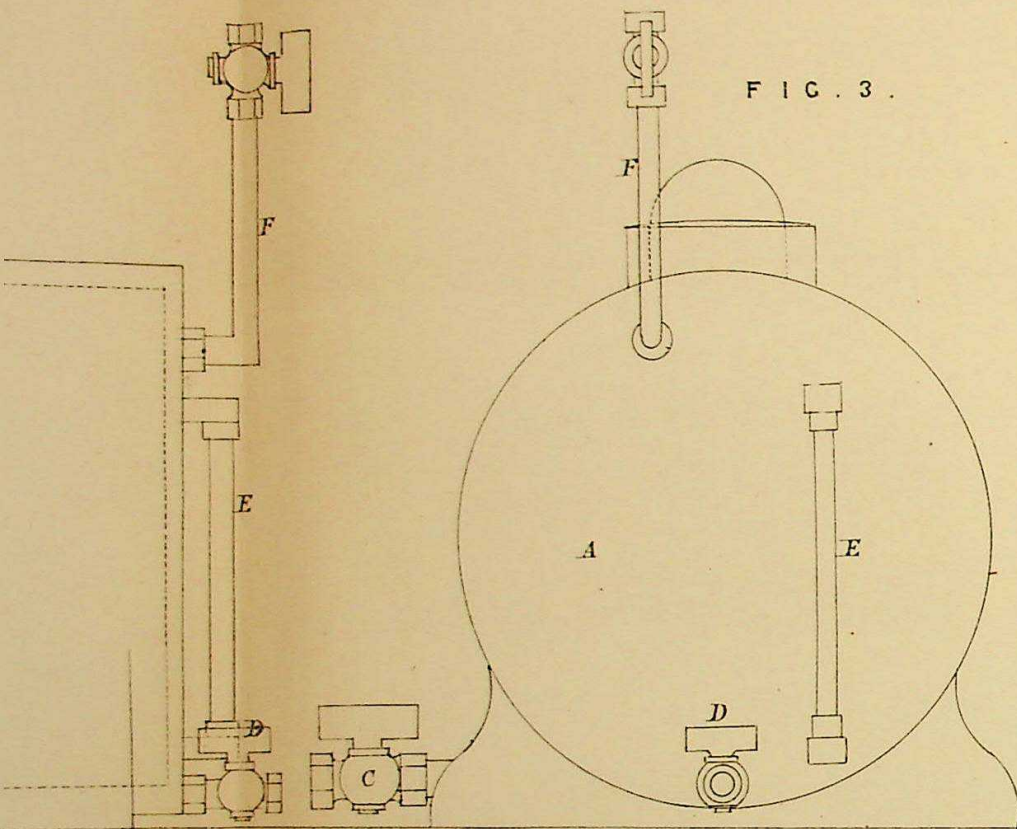


FIG. 3.

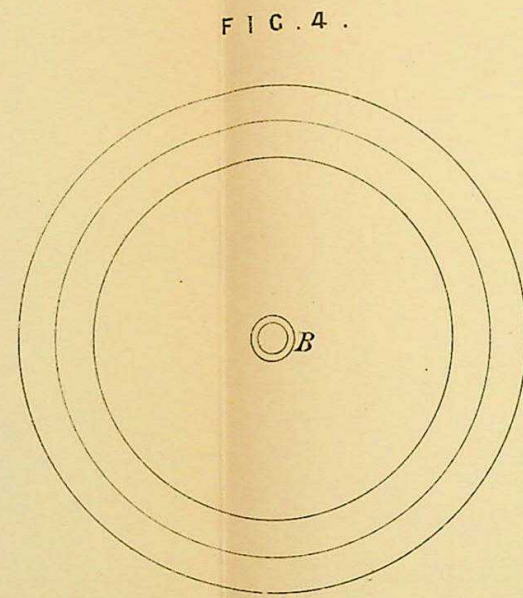


FIG. 4.

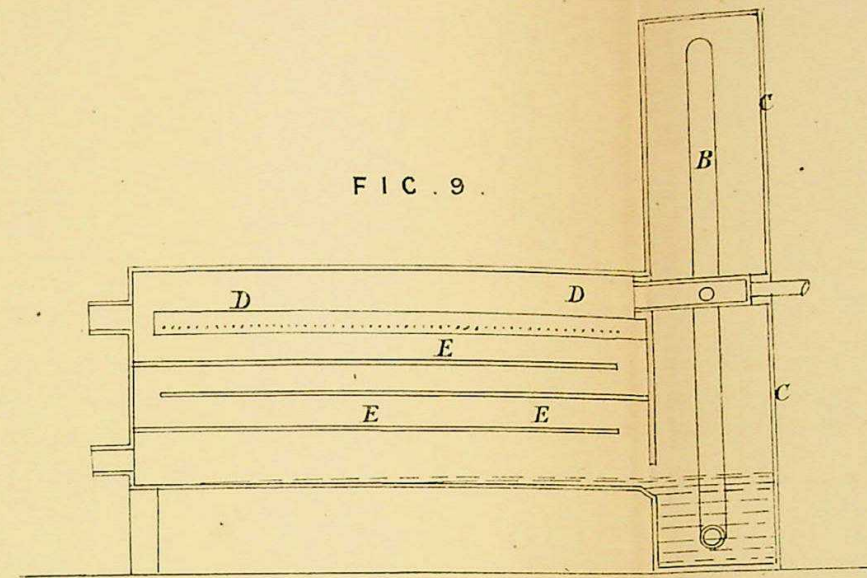


FIG. 9.

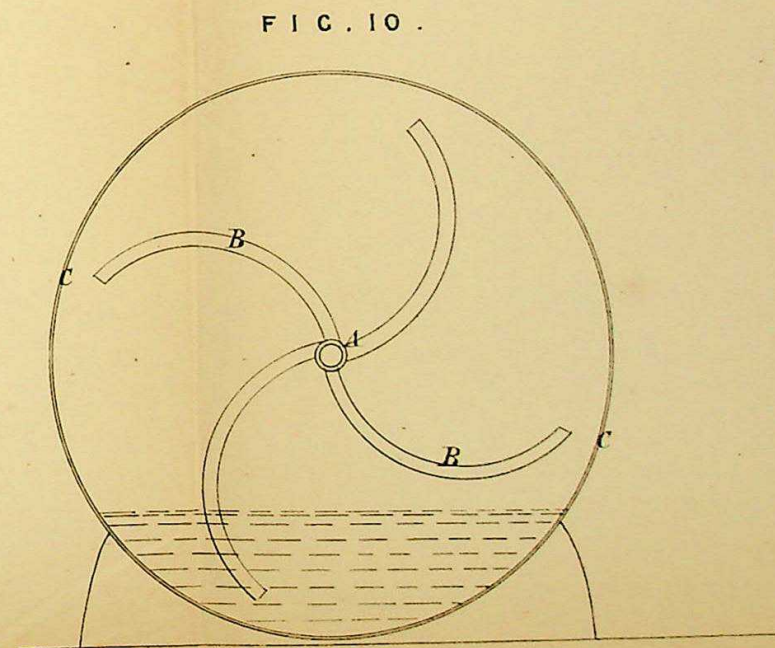


FIG. 10.

FIG. 7.

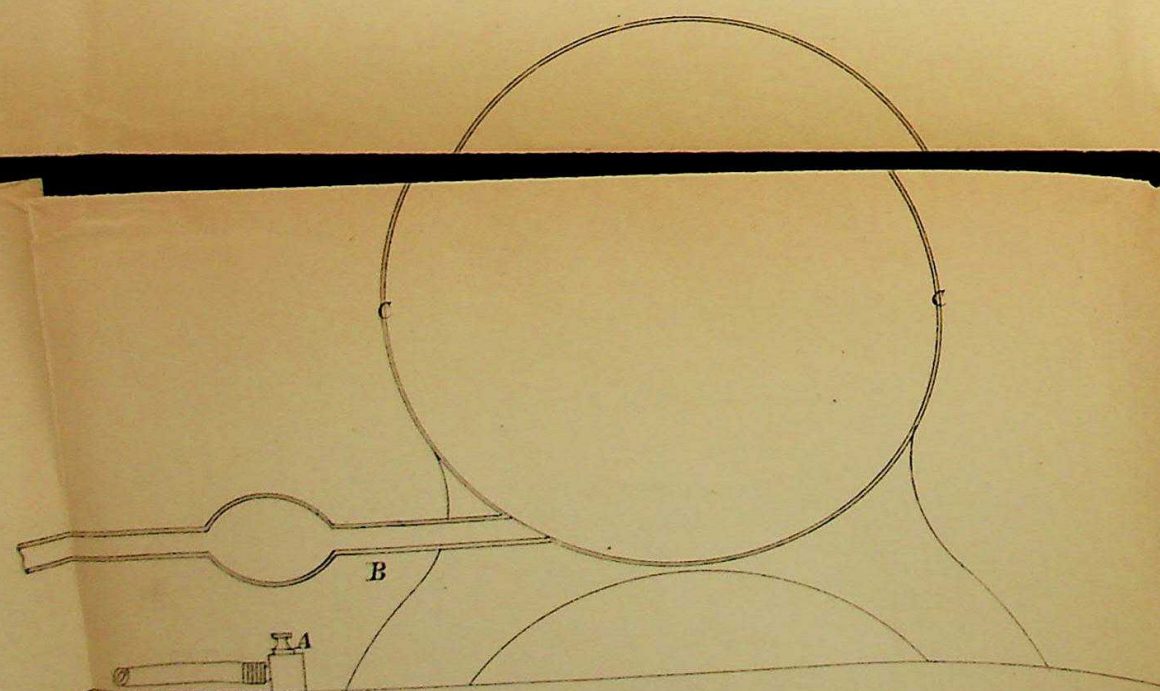


FIG. 8.

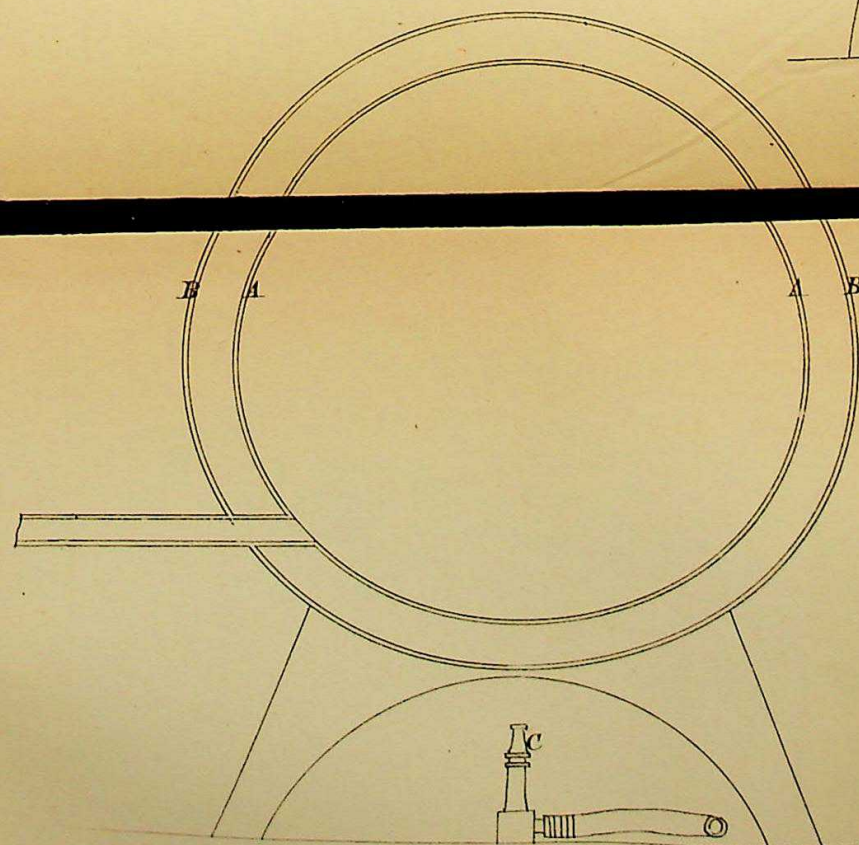
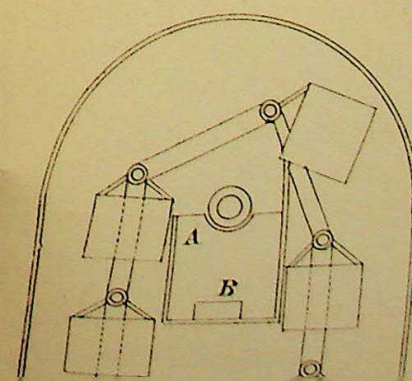


FIG. 11.



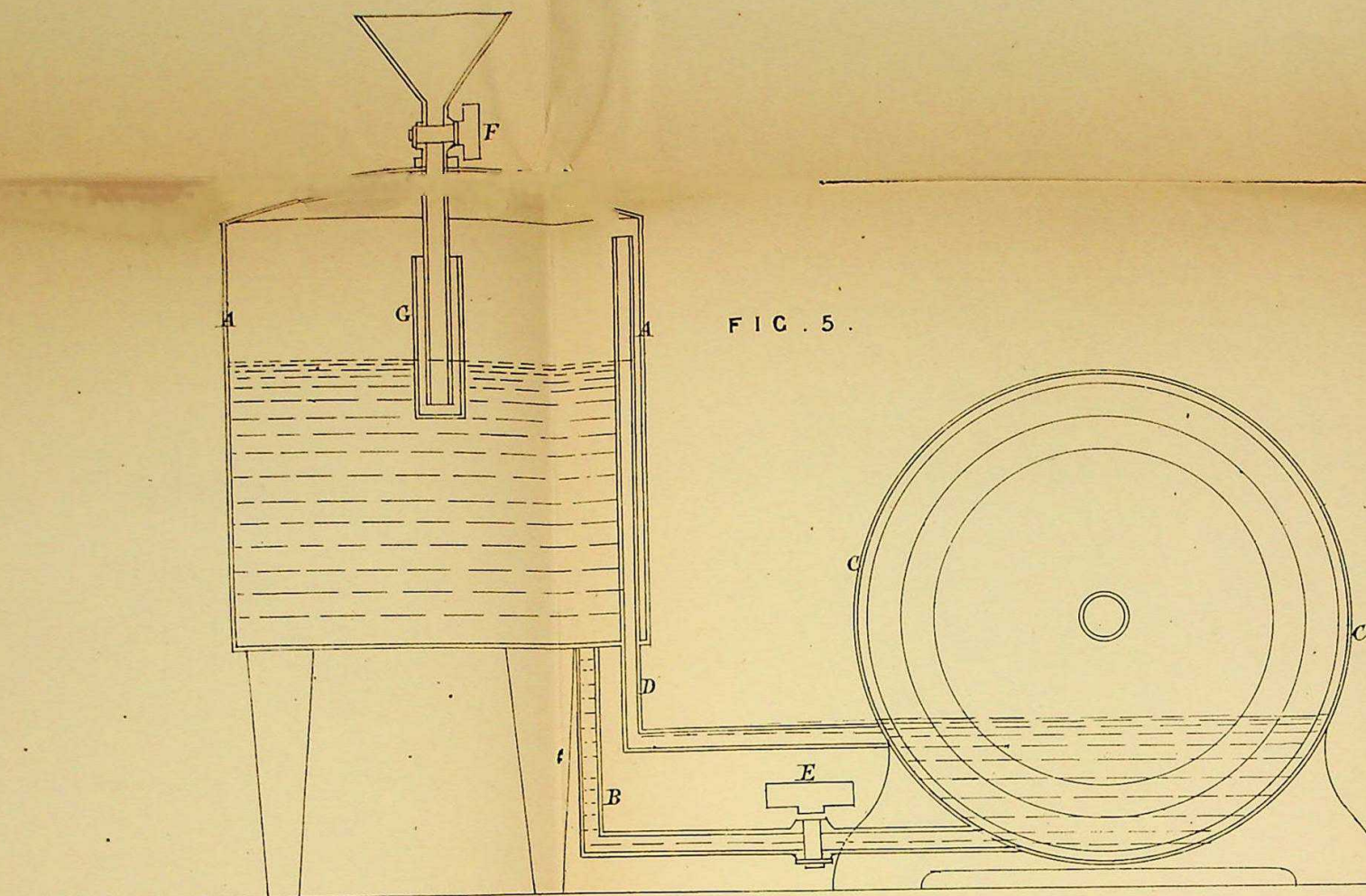


FIG. 5.

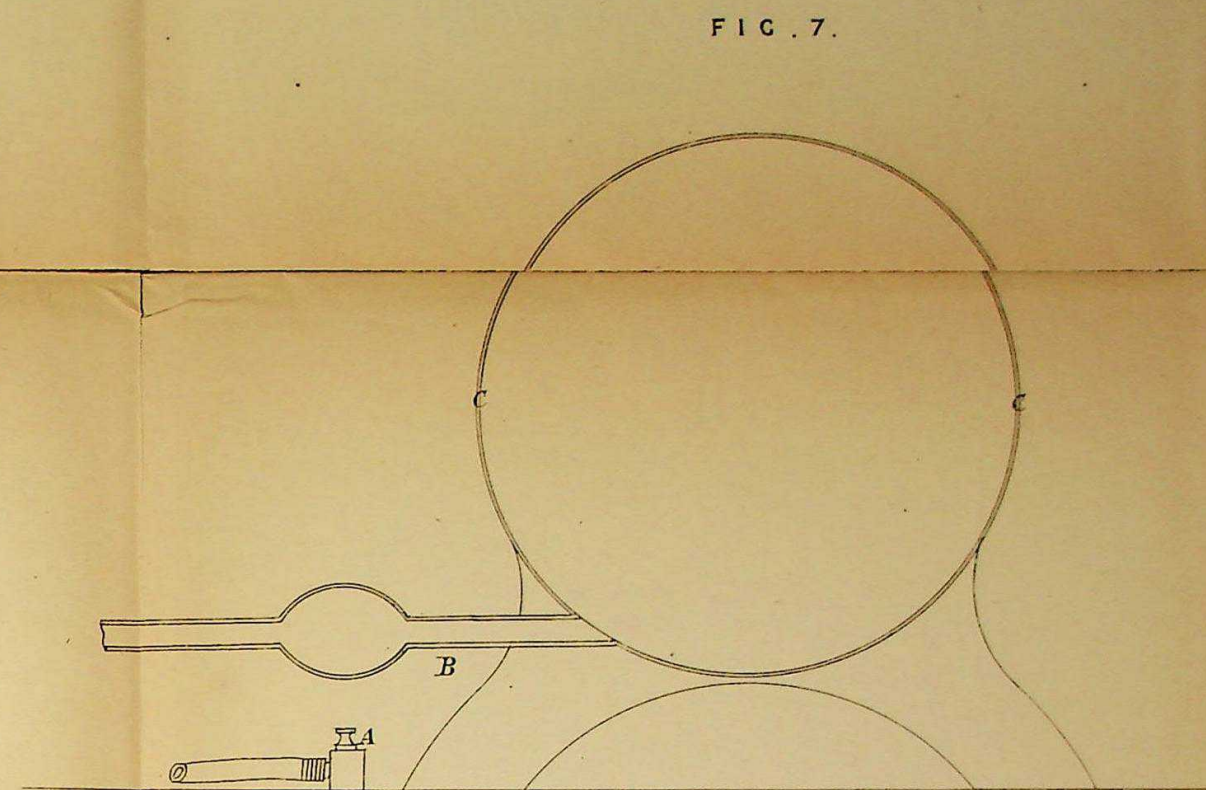


FIG. 7.

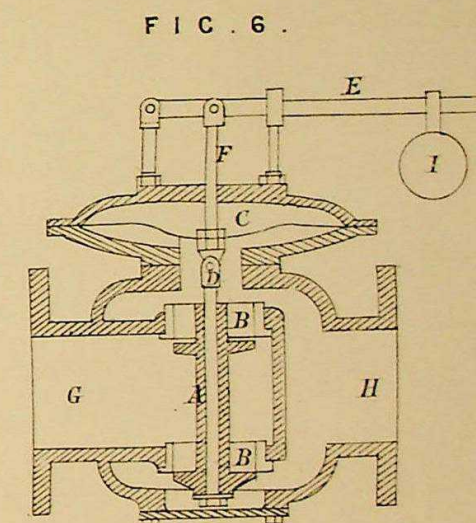


FIG. 6.

The filed drawing is not colored

FIG. 7.

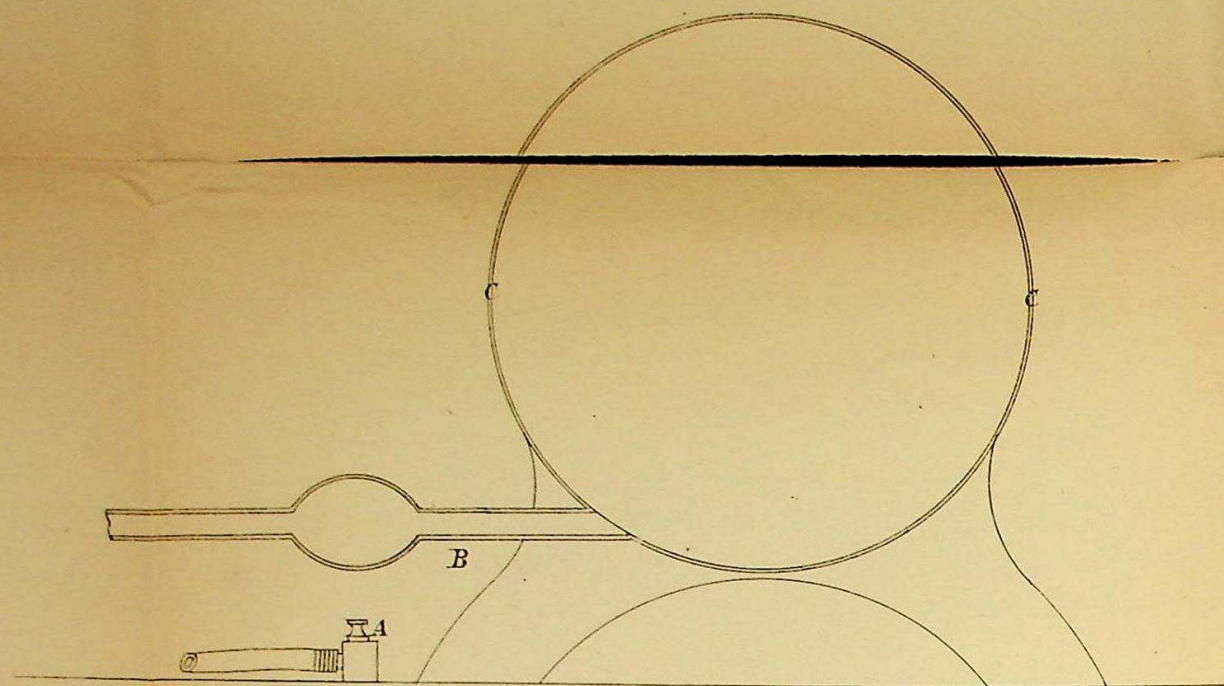


FIG. 6.

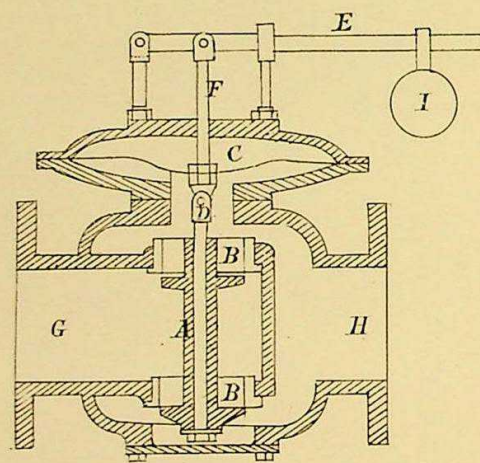


FIG. 8.

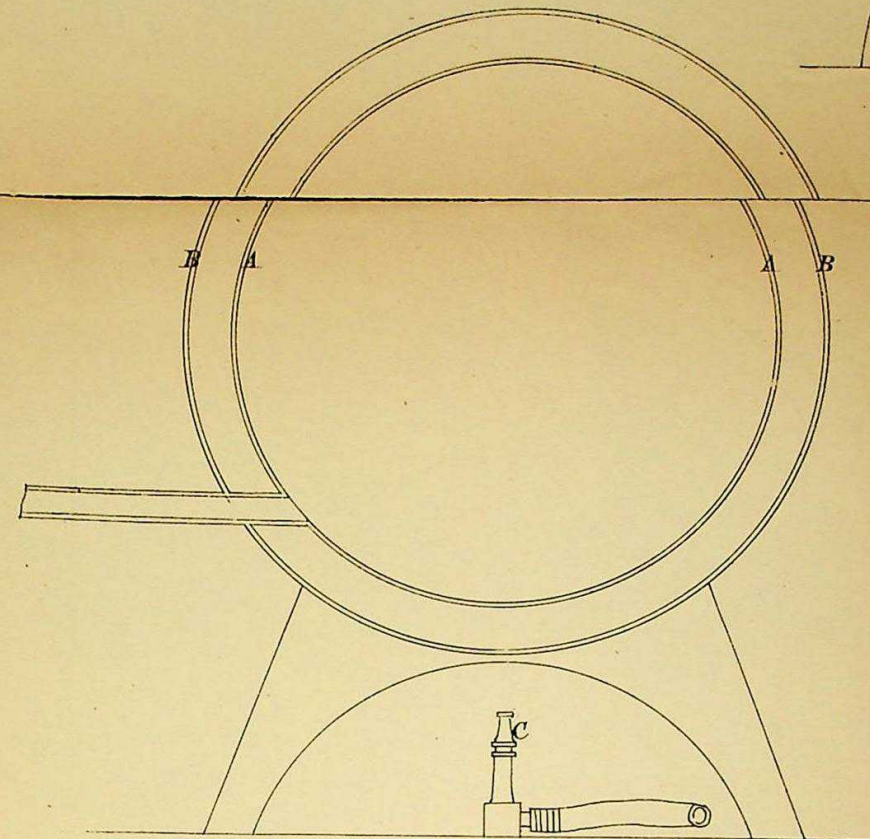
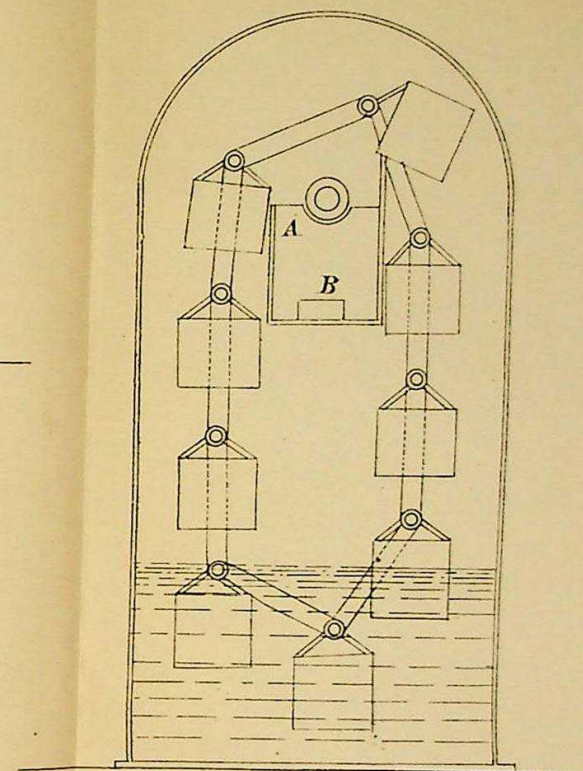


FIG. 11.



Drawn on Stone by Malby & Sons.